

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

CLAIMS

1. A plasma processing unit comprising:
 - a processing container whose inner pressure can be reduced,
 - a first electrode arranged in the processing container,
 - a process gas supplying unit that supplies a process gas into the processing container,
 - a high-frequency electric power source that outputs high-frequency electric power having a frequency in a VHF band,
 - a matching unit electrically connected to the high-frequency electric power source and the first electrode for impedance matching, and
 - a transmission line that transmits the high-frequency electric power from the high-frequency electric power source to the matching unit,wherein
 - a substrate to be processed is adapted to be arranged in the processing container,
 - the high-frequency electric power transmitted to the first electrode is adapted to generate plasma in such a manner that the substrate to be processed can undergo a plasma process by means of the plasma, and
 - the transmission line has a length shorter than a length wherein a resonance state of a third harmonic wave of the high-frequency electric power may be generated.
2. A plasma processing unit according to claim 1, wherein
 - the length of the transmission line is shorter than $\lambda/2$, λ being a wavelength of the third harmonic wave of the high-frequency electric power, and
 - with respect to the third harmonic wave of the high-frequency electric power, an output terminal of the high-frequency electric power source and an input terminal of the matching unit are electrically short-circuited ends,

respectively.

3. A plasma processing unit according to claim 1, wherein the length of the transmission line is shorter than $3\lambda/4$, λ being a wavelength of the third harmonic wave of the high-frequency electric power, and

with respect to the third harmonic wave of the high-frequency electric power, an output terminal of the high-frequency electric power source is an electrically short-circuited end and an input terminal of the matching unit is an electrically open end.

4. A plasma processing unit according to claim 1, wherein the high-frequency electric power source includes:

a high-frequency electric power generating part that generates the high-frequency electric power when direct-current power is supplied thereto, and

a filter that selectively allows the high-frequency electric power from the high-frequency electric power generating part to pass therethrough, and

the filter has an output terminal connected to the transmission line as an electrically short-circuited end with respect to the third harmonic wave of the high-frequency electric power.

5. A plasma processing unit according to claim 4, wherein the high-frequency electric power source further includes a circulator that allows a forward wave from the high-frequency electric power generating part to pass therethrough and that absorbs a reflected wave from the matching unit, between the high-frequency electric power generating part and the filter.

6. A plasma processing unit according to claim 1, wherein the transmission line consists of a coaxial cable.

7. A plasma processing unit according to claim 1, wherein the frequency of the high-frequency electric power is not less than 70 MHz.

8. A plasma processing unit according to claim 1, wherein a second electrode is arranged in the processing container in parallel with and opposed to the first electrode.

9. A plasma processing unit according to claim 8, wherein the substrate to be processed is adapted to be placed on the first electrode, and a vent hole is provided in the second electrode to jet out the process gas toward the first electrode.

10. A plasma processing unit according to claim 8, wherein the substrate to be processed is adapted to be placed on the second electrode, and a vent hole is provided in the first electrode to jet out the process gas toward the second electrode.

11. A high-frequency electric power supplying unit that supplies high-frequency electric power having a frequency in a VHF band to a first electrode arranged in a processing container whose inner pressure can be reduced, comprising:

a high-frequency electric power source that outputs the high-frequency electric power,

a matching unit electrically connected to the high-frequency electric power source and the first electrode for impedance matching, and

a transmission line that transmits the high-frequency electric power from the high-frequency electric power source to the matching unit,

wherein

the transmission line has a length shorter than a length wherein a resonance state of a third harmonic wave of

the high-frequency electric power may be generated.

12. A high-frequency electric power supplying unit according to claim 11, wherein

the length of the transmission line is shorter than $\lambda/2$, λ being a wavelength of the third harmonic wave of the high-frequency electric power, and

with respect to the third harmonic wave of the high-frequency electric power, an output terminal of the high-frequency electric power source and an input terminal of the matching unit are electrically short-circuited ends, respectively.

13. A high-frequency electric power supplying unit according to claim 11, wherein

the length of the transmission line is shorter than $3\lambda/4$, λ being a wavelength of the third harmonic wave of the high-frequency electric power, and

with respect to the third harmonic wave of the high-frequency electric power, an output terminal of the high-frequency electric power source is an electrically short-circuited end and an input terminal of the matching unit is an electrically open end.

14. A high-frequency electric power supplying unit according to claim 11, wherein

the high-frequency electric power source includes:

a high-frequency electric power generating part that generates the high-frequency electric power when direct-current power is supplied thereto, and

a filter that selectively allows the high-frequency electric power from the high-frequency electric power generating part to pass therethrough, and

the filter has an output terminal connected to the transmission line as an electrically short-circuited end with respect to the third harmonic wave of the high-

frequency electric power.

15. A high-frequency electric power supplying unit according to claim 14, wherein

the high-frequency electric power source further includes a circulator that allows a forward wave from the high-frequency electric power generating part to pass therethrough and that absorbs a reflected wave from the matching unit, between the high-frequency electric power generating part and the filter.

16. A high-frequency electric power supplying unit according to claim 15, wherein

the high-frequency electric power generating part is connected via a cable to a direct-current power source that converts alternating-current power of commercial frequency into the direct-current power.

17. A high-frequency electric power supplying unit according to claim 11, wherein

the transmission line consists of a coaxial cable.

18. A high-frequency electric power supplying unit according to claim 11, wherein

the frequency of the high-frequency electric power is not less than 70 MHz.